

Patent claims

1. Cooling system (10) for cooling heat-generating installations (44, 46, 48) and for maintaining the temperature of closed-off areas at below cabin temperature in an aircraft, with
 - a refrigerating installation (12),
 - at least one refrigeration consumer (44, 46, 48) constructed as a heat-generating installation or as an area to be maintained at a temperature below cabin temperature and
 - a refrigeration transport system (14) connecting the refrigerating installation (12) and the refrigeration consumer (44, 46, 48), the refrigerating installation (12) comprising at least one refrigeration machine (18, 20) which covers the maximum refrigeration requirement of the at least one refrigeration consumer (44, 46, 48) and the at least one refrigeration consumer (44, 46, 48) being supplied with cold generated in the refrigerating installation (12) via a refrigerating agent circulating in the refrigeration transport system (14).
2. Cooling system (10) according to claim 1, characterised in that the refrigerating installation (12) has at least two refrigeration machines (18, 20) which operate independently of one another and are coupled to the refrigeration transport system (14) in parallel.
3. Cooling system (10) according to claim 1 or 2, characterised in that the number of refrigeration machines (18, 20) of the refrigerating installation (12) is chosen in such a way that the refrigeration requirement of the aircraft is covered during ground operation.
4. Cooling system (10) according to one of the preceding claims, characterised in that at least one refrigeration machine (18, 20) uses air inside the pressurised fuselage of the aircraft as a heat sink for emitting heat.

5. Cooling system (10) according to one of the preceding claims, characterised in that the at least one refrigeration machine (18, 20) generates cold by a cold vapour process.
- 5 6. Cooling system (10) according to one of the preceding claims, characterised in that the refrigeration transport system (14) has at least one refrigerating agent pump (32, 34) for circulating the refrigerating agent.
- 10 7. Cooling system (10) according to one of the preceding claims, characterised in that the refrigeration transport system (14) has at least one store (40) for compensating for thermal expansion and leakage losses of the refrigerating agent.
- 15 8. Cooling system (10) according to one of the preceding claims, characterised in that the at least one refrigeration consumer (44, 46, 48) has a secondary refrigeration transport system in which cold is transmitted from the refrigerating agent by means of a secondary refrigerating agent, preferably air.
- 20 9. Cooling system (10) according to one of the preceding claims, characterised in that a central control unit is provided which controls the refrigeration capacity depending on at least one parameter indicating the current refrigeration requirement.
- 25 10. Cooling system (10) according to claim 9, characterised in that the parameters indicating the current refrigeration requirement reproduce the temperature of the refrigerating agent at at least one point in the refrigeration transport system (14) or/and information on the refrigeration requirement of the at least one refrigeration consumer (44, 46, 48) or/and the pressure of the refrigerating agent in the refrigeration transport system (14).
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- 5 11. Cooling system (10) according to one of the preceding claims, characterised in that the refrigeration capacity is controllable by switching on and off individual refrigeration machines (18, 20) of the refrigerating installation (12) to match the current refrigeration requirement in the aircraft.
- 10 12. Cooling system (10) according to claim 2 or 3 and one of claims 9 to 11, characterised in that the central control unit activates the refrigeration machines (18, 20) in such a way that on average in terms of time they have substantially the same length of operation.
- 15 13. Cooling system (10) according to one of the preceding claims, characterised in that the refrigeration machines are controlled in decentralised manner, in particular by an automatic and time-dependent activation based on a monitoring of the actual status of all refrigeration machines via a databus .
- 20 14. Cooling system (10) according to claim 13, characterised in that the refrigeration machines are activatable according to a predetermined prioritisation, preferably in varying order.
- 25 15. Cooling system (10) according to one of the preceding claims, characterised in that the refrigerating agent flows through both a switched on refrigeration machine (18, 20) and a switched off refrigeration machine.
- 30 16. Cooling system (10) according to one of claims 1 to 14, characterised in that a shut-off valve is assigned to each refrigeration machine.
17. Cooling system (10) according to claim 9 and one further claim of the preceding claims, characterised in that the refrigeration capacity of the at least one refrigeration machine (18, 20) is controllable, preferably continuously, by means of the control device.

18. Cooling system (10) according to claim 9 and one further claim of the preceding claims, characterised in that the control unit detects the outflow temperature of the refrigerating agent leaving the refrigeration machine (18, 20) and activates the refrigeration machine (18, 20) in accordance with the detected outflow temperature.
19. Cooling system (10) according to claim 18, characterised in that the refrigeration capacity of the at least one refrigeration machine (18, 20) can be altered by means of a hot gas bypass valve and/or by varying the speed of a compressor used in the refrigeration machine (18, 20).
20. Cooling system (10) according to claim 9 and one further claim of the preceding claims, characterised in that to influence the refrigeration capacity of the cooling system (10) the control unit alters the amount of refrigerating agent conveyed in the refrigeration transport system (14).
21. Cooling system (10) according to claim 20, characterised in that to influence the refrigeration capacity the control unit alters the speed of the at least one refrigerating agent pump (32, 34).